



Green Schools News

EmPOWERing Maine Students to Know Their SOURCE



Fall 2004

Volume 5, Issue 1

Students Seek to Green Their Schools



Lights, Camera, and Vending Miser Action!

We're not filming a movie starring the Vending Miser, but WCSH TV6 News recently paid a visit to **Marshwood High School** (MHS) in South Berwick, to learn more about the results of the student's Vending Miser Challenge.

What's the Challenge? Reducing their school's electricity bill (and pollution!) is the goal of the Vending Miser Challenge.



Marshwood High School students in South Berwick interviewed by WCSH TV6 News

The research project proposed to teachers last fall was to verify the claim that their school could save an average of 50 percent of the electricity used by vending machines. MEEP loaned them a simple electronic device called a Vending Miser along with other equipment to measure the electricity used. Students at

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Biodiesel Enters Mix as School Energy Source

Reduced reliance on fossil fuels! Decreased pollution! Cleaner air! Students at **Waynflete School** in Portland, as well as **Falmouth High School** voiced the cry then decided to take action. For both heat and transportation, biodiesel is a renewable resource because it is made from commercially grown products like soybeans or even used cooking grease. When in combination with conventional fuel, it is usually referred to as B5, B10, B20 or B80 depending on the amount of biodiesel mixed with regular diesel fuel. The fuel makes for a cleaner burning alternative to the petroleum based diesel fuel or #2 heating oil.

Two years ago, a group of Waynflete students raised \$600 (biodiesel is

more expensive than conventional fuel, so a cost offset was needed) to fuel a school bus with B20. At the time, the nearest biodiesel fueling station was the Solar Market (in Arundel), so the bus could only be fueled up on athletic bus runs that traveled by Arundel. With the lack of a nearby fuel station, Waynflete students realized that using biodiesel for transportation might not be the most practical use of the fuel for their school. Thus, they came up with the idea for using B20 for heat.



Waynflete School in Portland was heated with biodiesel this past March thanks to

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Green Schools News is a publication of:

Maine Energy Education Program (MEEP) and the Maine Department of Environmental Protection, Air Bureau (MDEP)

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What can the Green Schools Program do for you?



Encourage interdisciplinary learning and environmental awareness.



Foster better communication between students, teachers, custodians and administrators.



Help your school save electricity, which results in more money for books and classroom supplies.

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Students Promote Pedal Power at Falmouth High School

As part of their Environmental Science class project, Falmouth High School (FHS) students Ashley Bealieu, and Hannah Monu worked to bring a previously non-existent bike rack to FHS to encourage the use of a zero emission mode of transportation at their school.

With nearly 600 students at the new FHS, it's hard to imagine that this type of transportation was completely overlooked when building the new school. The first students to apply and receive a grant from the Falmouth Education Foundation, they used their \$500 grant to purchase a bike rack that will hold 12 bikes.



Can Pedal Power work for you?

The next step of their project is to encourage traveling via bike to and from school. With the idea of providing extra credit incentives in science classes, the students hope to increase **pedal power**. Other steps and suggestions in pro-

moting the use of the bike rack include raising the awareness of students, teachers, and the community about unnecessary pollution that can be prevented by increasing the use of bikes.



Check Out MEEP's Bright Idea for a Student Fundraiser

What do a ten dollar roll of wrapping paper, an over-priced box of chocolates, and a compact fluorescent lightbulb (CFL) have in common? They are all exam-



energy and money on the electricity bill at the same time!

ples of items students can sell to raise money for their schools. Which is the most practical? A

Help save the environment and raise money for your school at the same time, with compact fluorescent light bulbs!

CFL. If your school needs to raise money, why not choose an item that is practical, educational and helps to save

A number of schools have taken advantage of MEEP's fund raising opportunity including Troy Howard Middle School, in Belfast. Patti Bosken, whose students participated, said she "liked selling the light bulbs because they are useful; so the families avoid feeling pressured into buying something that isn't needed."

She says, "most students had not heard of CFLs, so they learned a lot in the process of the fundraiser."

CFLs cost more than a regular incandescent lightbulb (the ones that most people have in their homes), but because they last up to ten times as long and use only 30% of the electricity, they can save over \$50 over the life of the bulb. For more information including how your school can raise money by selling CFLs, please contact MEEP.

Save the Date and Sign up Today!

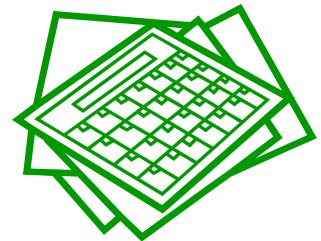
MEEP's annual fall student and teacher workshops are fast approaching...

Grades 4-8, Energy Education Leadership Workshops:

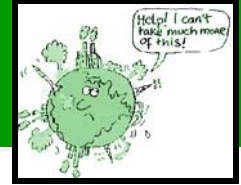
October 14, Bethel Inn and Country Club, Bethel
October 19, South Berwick Town Hall, South Berwick
October 22, Penobscot Job Corps Center, Bangor
October 26, Woodfords Congregational Church, Portland
November 9, Cohen Center, Hallowell
November 16, Chewonki Foundation, Wiscasset

Grades 6-12, Transportation and the Environment Workshops:

November 2, Owls Head
Transportation Museum, Owls Head
November 5, Woodfords Congregational Church, Portland



Maine Schools Raising the Bar With Renewable Energy Technologies.



Geothermal Energy is now a Source for Heating and Cooling in Schools in several Maine schools

This athletic playing field at **Gorham Middle School (GMS)** looks like any other school field. But after chatting with Director of Maintenance Paul Roney, we learned that underneath the field is a complex system of 116 wells used to heat and cool the school. Maine certainly isn't sitting on a hot bed of geothermal activity, but with heat exchange technology (the way a refrigerator or air conditioner heats or cools outside air) commercial and residential applications, including four



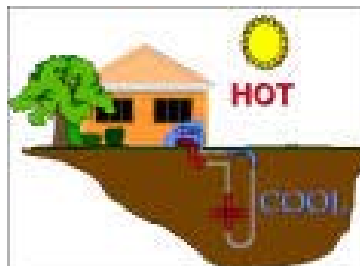
schools, are becoming more common in Maine. Although a more expensive

investment initially, schools experience huge energy savings when installing such a system; the main reason why Gorham looked at installing a geothermal system in its new middle school. The building committee pushed for the green technology used for heating and cooling because it uses less fossil fuels.

Because the temperature of the water below 300 feet in the ground remains around 50 degrees the entire year, the water acts as a means to cool or heat the school. GMS's wells are all coupled with a U-shaped pipe filled with an antifreeze solution. The heat is transferred from the ground to the solution and moved to a heat exchange pump. Here, the heat is extracted and moved throughout the school.

Camden Hills Regional High School (CHRS), **Central Institute** in Pittsfield, and **Merriconeag Montessori School**

in Freeport also have geothermal systems installed at their schools. There is, however, a difference between these schools and GMS's geothermal system. These other three schools all have an "Open System" which moves the water and extracts heat directly from water as it circulates through the heat exchanger. Then the water is returned to the well.



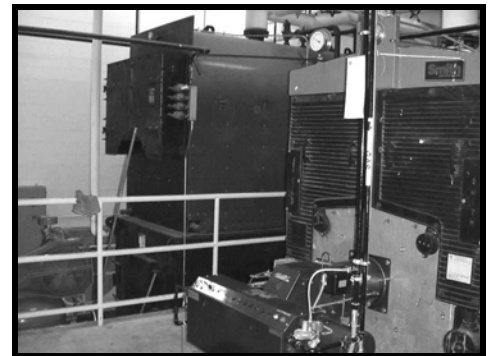
Although these schools may have a somewhat higher electricity bill due to the pumping requirements, they no longer use oil as their main energy source. Because of a centralized control system, efficiency is very high; and they are finding significant savings on their overall energy costs.

Biomass Boiler used to Heat Turner School

The first and only school in Maine using biomass as a heat source for its school, Leavitt Area High School in Turner, started doing so six years ago in order to save money (and use a renewable resource). According to Business Director Chris Trenholm, an advantage of using woodchips, a **biomass** energy supply, is the cost: about half as much as a comparable amount of oil.

The way the biomass burner works is fairly simple. A truckload worth of woodchips is delivered and fills the storage tank to capacity. A floating auger in the tank spins to move a constant supply of woodchips onto a conveyor belt and into the burner.

An oil burner is used for backup and there is a constant need for wood chips during cold weather because of their small storage



tank. It does require a little extra maintenance than a conventional oil furnace as it needs to be cleared of ash once a day.

Biomass fuels can include wood, wood waste, straw, manure, sugar cane, and other by-products from a variety of agricultural processes, that can be burned in order to produce heat or electricity.

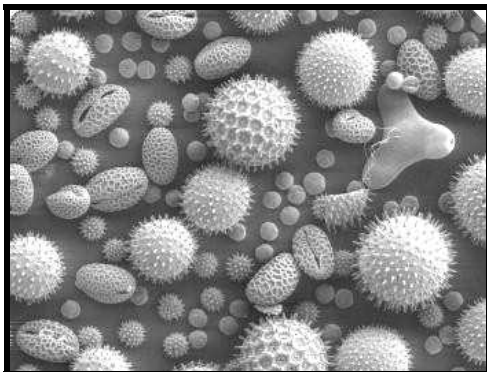
Although biomass can produce higher amounts of particulate air pollutants when burned, these renewable fuel materials are thought of as environmentally friendly because they are considered *carbon neutral*. This means that because they do not tap underground sources of carbon (fossil fuels), they yield no additional greenhouse gas emissions into the atmosphere and therefore do not contribute to climate change.

The Climate Time Machine Activity

Using fossil pollen to study climate change

In the spring time, pollen signifies the long awaited arrival of warm weather. For some, pollen means unpleasant allergies. For paleoclimatologists, scientists who study past climates, pollen is like a climate time machine!

Pollen that settles on top of a water body eventually drops to the bottom where it gets trapped in the sediment. As sediment and pollen accumulate, the annual layers increase in thickness. Paleoclimatologists extract long tubes of sediment cores, and use them to figure out how climate conditions might have changed over time. The fossilized pollen is extracted and identified to see what plant species were prevalent in the past. Because scientists know the climate conditions that species prefer, they can infer what the climate was like during those time periods.



In "The Climate Time Machine" activity, students will look for "simulated pollen in lake sediment". Based on actual pollen data collected from Battleground Lake in southwest Washington, students will track how the climate has changed 20,000 years ago to the present. Use these instructions to prepare this activity for your students. For scientific research extension, check out this neat internet site: www.ngdc.noaa.gov/paleo/pubs/williams2004/williams2004.html



Actual Sediment Core



Time: one hour prep, one hour for activity

Materials needed:

- Pictures of several types of pollen (found on any internet search engine)
- One large graduated cylinder or tube to "simulate lake sediment" core (picture at right)*
- Pie tins or sample pans (one for each of the five sediment samples, more if your class is large)
- Eleven different colors of paper "dots" (construction paper and a hole punch)
- Powdered Chalk (five different colors to represent the five different sediment layers)
- Salt (~5 pounds)
- Plastic quart size freezer bags for storing sediment samples
- Information sheets: Table 1, Table 2, data sheets, and Climate/Vegetation info cards* from web site (see <[www.MaineDEP.com..Blue Skies For ME.....Climate Change Pollen Activity](http://www.MaineDEP.com..Blue%20Skies%20For%20ME.....Climate%20Change%20Pollen%20Activity)>)



Materials Prep:

1. Make "simulated sediment" by placing salt in a plastic bag with powdered chalk. You will need enough colored salt to make sediment samples for students plus optional sediment core.
2. Layer and label five different colors of salt/chalk in sediment tube to create "sediment core"
3. Bag and label salt/chalk into five bags and label with the age range the "sediment" represents (per Info sheet—Table 2).
4. Following table 2, assign each species a corresponding color of construction paper dots. Be sure to write down the colors to avoid later confusion. Place corresponding number of dots for each species into the correct bag of sediment.

** optional*

Procedure

- Divide students into five teams. Distribute one sediment sample and one pan/tin to each group of students. Students can then empty the contents of their sample into the tin, separating the pollen from the sediment.
- Students must record the color and amount of pollen found, and the age of their sediment layer on a data sheet.
- Using Table 1, students can then identify the plant species which the colored pollen represents. Based on the climate conditions each species prefers and the amount of pollen found that belongs to that species. Students should infer what the climate was like during that particular time. If desired, students can label their period with a "climate number" of 1 - 10, 1 being very cold, 5 being similar to current climate in South-west Washington, and 10 being very hot.
- Collectively, students can compare their results and can graph how vegetation and climate has changed over time. Sample graphs are available on the web.

Table 2: Battleground Lake Study: Pollen/Vegetation Distribution

Sediment Layer	Plant Species	Dot Color	# Simulated Pollen Grains—Dots	Percent-age
5 (4,500 years before present (ybp) to present)	Cedar		6	25
	Hemlock		5	20
	Douglas Fir		10	40
	Alder		4	15
4 (4,500 ybp to 9,500 ybp)	Douglas Fir		3	10
	Oak		3	10
	Mixed Meadow Species		19	80
3 (9,500 ybp to 11,200 ybp)	Douglas Fir		7	30
	Grand Fir		5	20
	Alder		13	50
2 (11,200 ybp to 15,000 ybp)	Lodgepole Pine		7	30
	Englemann Spruce		3	15
	Grasses & Sedges		3	15
	Alpine Sagebrush		9	30
			3	10
1 (15,000 ybp to 20,000 ybp)	Grasses & Sedges		15	60
	Alpine Sagebrush		4	15
	Lodgepole Pine		4	15
	Englemann Spruce		2	10

Table 1: Pollen Key and Climatic Characteristics, SW Washington Pollen Research Study

Species	Climate Characteristics
Western Hemlock	Principal dominant tree of lowland, temperate conditions. Requires very moist, temperate conditions for growth.
Douglas Fir	Broadly distributed throughout Pacific Northwest from moderately cool to warm sites. Grows best under temperate, somewhat moist conditions.
Grasses & Sedges	This pollen from grasses and sedges typically found in very cool alpine/subalpine meadow sites characterized by very cool summers, harsh winters, and short growing seasons
Alder	Widespread throughout Northwest, often colonizing gravel bars or other poor soils. Prefers abundant water and can grow in cool climates.
Grand Fir	Found at mid-level elevations in Cascade Mountains. Grows in cool climates, but not as cold tolerant as trees found at higher altitudes.
Englemann Spruce	Found in cold, usually subalpine sites. It is an important timberline species in the Rocky Mountains.
Western Red Cedar	Found only in temperate, very moist climates.
Lodgepole Pine	Found in areas of very cool climates typically growing in poor soils, often at high altitudes (above 3500 feet) under present climate.
Mixed Meadow Species	This pollen is typical of a mixture of herbaceous plants common to warm-temperate meadowlands. Typically, these species grow in areas of warm summer temperatures and summer drought.
Oak	Found in warm-temperature sites characterized by dry, warm summers.
Alpine Sagebrush	Woody, low growing shrub found only at high-altitude, cold sites.

The Junior Solar Sprint: From Owls Head, ME to Springfield, MA

"I loved doing this! Best science project I've ever done." Those student uttered words are music to a teacher's ears.



Devin Littlefield readies "Yellowman" for a run at Owls Head JSS race.

teacher's ears. And they're pretty common to middle-schoolers involved in what has become one of the MEEP's most popular offerings, the Junior Solar Sprint. A national competition, the Sprint challenges 5th-

8th grade students to design, build and race model cars powered by electricity from sunlight---photovoltaics!

On Saturday, June 5, 48 teams from Maine schools convened at the Owls Head Transportation Museum near Rockland under sunny skies to participate in the 10th Annual Junior Solar Sprint State Championship. Eleven teams qualified for the Northeast Finals on June 11 in Springfield, MA.

There, more than 100 of the most elite Sprint teams from Pennsylvania to Maine shared a courtyard with the statued creations from the books of "Dr. Seuss", a revered native. Before you could say "Cat in

the Hat", one of Maine's own---Stratton Elementary rising 7th grader Devin Littlefield---had skipped away with the First Place trophy for Craftsmanship. Was Devin excited? Said Devin's mom, Lori, "He had already begun designing next year's car before he left Springfield!"

The Junior Solar Sprint can be much more than a terrific science project. Enterprising teachers use the activity to introduce renewable energy, to discuss transportation alternatives, and to raise awareness about climate change. While MEEP coordinates the program in Maine, the Sprint's primary sponsor this year was the Bureau of Air Quality within Maine's Department of Environmental Protection, with additional support from "Friends of MEEP". The Northeastern Championship was hosted by the Northeast Sustainable Energy Association and funded by the US Army.

State Winners

Speed: *SPIRIT*: Tiana Turner, Desi Clark (James F. Doughty MS)

Innovation: *Midnight*: Jackson Witheral, Will Colon (Maranacook MS)

Technical Merit: *Drag-on*: Matthew Beck, Albert Lowe (Penobscot Valley Homeschool Association)

Craftsmanship: *Yellow Man*: Devin Littlefield (Strattor Elementary)

Kids Choice: *ACDC*: Kayla Phillips, Issac Safford, Kyle Blunt (Middle School of the Kennebunks)

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Vending Miser continued from page one...

Marshwood HS were just one of five schools this spring that stepped up to the plate. And what did they have to report to WCSH TV6 (and the rest of Maine)? A potential savings of \$200 per year per machine! "We were really surprised by the energy savings...and how much energy costs," agreed students Scott Massidda, Abby Leathe and Erwin Cusack. And with 7 cold drink machines at MHS, the electricity savings could add up to over \$1400 per year. With a \$50 rebate through the efficiency Maine program, the cost per Vending Miser is only \$130. Payback for the investment of installing a Vending Miser at MHS would be seven months, less than one school year!



Other schools that took the Vending Miser Challenge included **South Portland High School, Camden Hills Regional High School, and Lakes Region High School** in Bridgton. **D.R. Gaul Middle School** in Union also tested the Vending Miser. Teacher Laurie Olmsted's seventh grade science class found

savings similar to those of MHS's. The students in Union also estimated a potential savings of over \$5,000

per year if all 26 machines in their district were fitted with a Vending Miser! Olmsted and her class are still waiting to hear whether the school board will consider purchasing the Misers.

Taking the calculations a few steps further, Olmsted's students even estimated a potential savings of **\$2.25 million (over five years)** if all schools in the state installed these *Misers* on at least three machines. Perhaps with more testimonials on savings, school officials will jump on board and promote energy efficiency as a school priority.

The choice seems simple. The students are excited and willing to put in the time and effort to demonstrate ways their schools can save money and convince their school officials to purchase the devices. However, a presentation to the school board isn't required. You can still participate in the Vending Miser Challenge as a great science technology project for your students. Call Peter Zack at (207) 625-7833 or if you're up to the test!

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LATEST DEVELOPMENTS: A biodiesel fueling station recently opened at the Union Filling Station on Commercial Street in Portland and two more are planned for the Portland Area. Biodiesel is also available for delivery from Frontier Oil in China (445-4716), and at Solar Market in Arundel (1-877-785-0088).

Borrow a Climate Change Backpack filled with references, tools and activity ideas

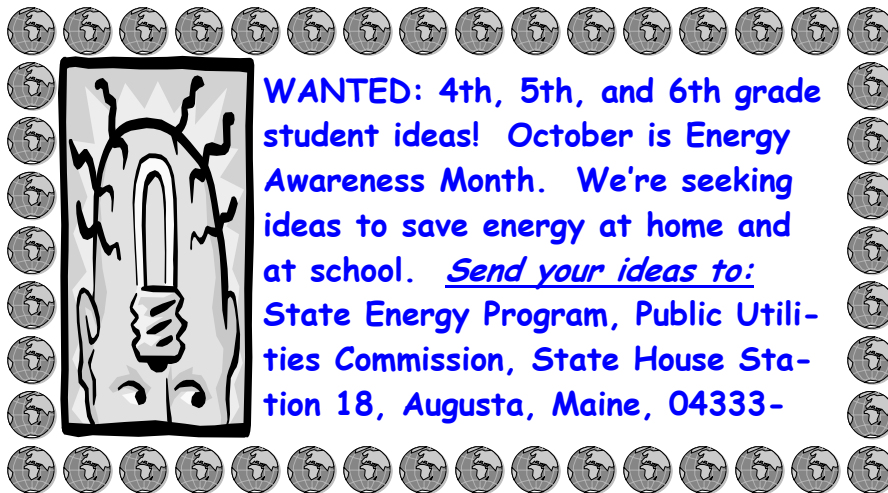


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Fall 2004 Issue

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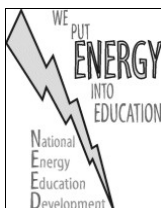
Maine Energy Education Program - Energy Activities in an Ecological Context
Phone: 207.625.7833 Email: meep@psouth.net Web: <http://www.meepnews.org>



WANTED: 4th, 5th, and 6th grade student ideas! October is Energy Awareness Month. We're seeking ideas to save energy at home and at school. Send your ideas to: State Energy Program, Public Utilities Commission, State House Station 18, Augusta, Maine, 04333-

Check out our website at
www.meepnews.org

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This issue of Green Schools News created by Jeremy Dubois
(SERVEMaine Volunteer, Maine DEP Bureau of Air Quality)

This pamphlet produced by the Maine DEP under appropriation
014 06A 1753 142